Wekepeke Wildlife Conservation Easement, Southeast

dcr

FOREST MANAGEMENT PLAN

Submitted to: Massachusetts Department of Conservation and Recreation
For enrollment in CH61/61A/61B and/or Forest Stewardship Program

SEP 1 7 2016

CHECK-OFFS

CH61	CH61A	CH61B	STWSHP	C-S
cert. ☐	cert. ☐	cert. ☐	new ☐	EEA ☐
recert. ☐	recert. ☐	recert. ☐	renew ☑	Other ☑
amend. ☐	amend. ☐	amend. ☐	FSC ☐	Birds ☐
			Conservation Rest. ☑	
Plan Change: _____ to _____			CR Holder DFG	

Administrative Box

Case No.	282-8692	Orig Case No.	
Owner ID	502443	Add. Case No.	
Date Rec'd	9/17/16	Ecoregion	221Ah
Plan Period	2017-2026	Topo Name	Sterling
Rare Spp. Hab.	NO	River Basin	Nashua

OWNER, PROPERTY, and PREPARER INFORMATION

Property Owner(s) Clinton Water Works

Mailing Address attn: Chris McGown; 242 Church Street; Clinton, MA 01510 Phone (978) 365-4110

Email Address

Property Location: Town(s) Sterling Road(s) Heywood Road

Plan Preparer **Michael Barry - Bay State Forestry Service** Mass Forester License # 11

Mailing Address 468 South Mountain Road; Northfield, MA 01360 Phone (774) 364-4192

RECORDS

Assessor's Map No.	Lot/Parcel No.	Deed Book	Deed Page	Total Acres	Ch 61/61A 61B *Excluded* Acres	Ch.61/61A 61B **Certified** Acres	Stewshp *Excluded* Acres	Stewshp Acres
32	1			62	0	0	0	62
21	32			127	0	0	0	127
			TOTALS	189.000	0.000	0.000	0.000	189.000

Excluded Area Description(s) **(if additional space needed, continue on separate paper)**

No Exclusion

HISTORY

Year acquired 1890-1910 Year management began 2008

Are boundaries marked: Yes ☐ blazed/painted/flagged/signs posted (circle all that apply) ? No ☐ Partially ☑

What treatments have been prescribed but not carried out (last 10 years if plan is a recert.)?

stand no. N/A treatment _____ reason _____

(if additional space needed, continue on separate page)

Previous Management Practices (last 10 years)

Stand #	Cutting Plan #	Treatment	Yield	Acres	Date
N/A					

Remarks: (if additional space needed, continue on separate page)

Landowner Goals

Please **check** the column that best reflects the importance of the following goals:

Goal	Importance to Me			
	High	Medium	Low	Don't Know
Enhance the Quality/Quantity of Timber Products*		X		
Generate Immediate Income			X	
Generate Long Term Income		X		
Produce Firewood			X	
Defer or Defray Taxes			X	
Promote Biological Diversity	X			
Enhance Habitat for Birds	X			
Enhance Habitat for Small Animals	X			
Enhance Habitat for Large Animals	X			
Improve Access for Walking/Skiing/Recreation		X		
Maintain or Enhance Privacy			X	
Improve Hunting or Fishing			X	
Preserve or Improve Scenic Beauty		X		
Protect Water Quality		X		
Protect Unique/Special/ Cultural Areas		X		
Attain Green Certification Other:			X	

*This goal must be checked "HIGH" if you are interested in classifying your land under Chapter 61/61A.

In your own words, describe your goals for the property:

Stewardship Purpose

By enrolling in the Forest Stewardship Program and following a Stewardship Plan, I understand that I will be joining with many other landowners across the state in a program that promotes ecologically responsible resource management through the following actions and values:

1. Managing sustainably for long-term forest health, productivity, diversity, and quality.
2. Conserving or enhancing water quality, wetlands, soil productivity, carbon sequestration, biodiversity, cultural, historical and aesthetic resources.
3. Following a strategy guided by well-founded silvicultural principles to improve timber quality and quantity when wood products are a goal.
4. Setting high standards for foresters, loggers and other operators as practices are implemented; and minimizing negative impacts.
5. Learning how woodlands benefit and affect surrounding communities, and cooperation with neighboring owners to accomplish mutual goals when practical.

Signature(s): _____ **Date:** 7-20-16

Owner(s) (print) Marc S. Iacobucci, Chair Clinton Board of Selectmen

(This page will be included with the completed plan.)

Active Forest Management Philosophy
For Municipally Owned Conservation Land

Management of forest land has become a controversial issue in southern New England as open space becomes more scarce, and the impacts of conducting forestry practices becomes less familiar to the general public. This is especially true on public lands, where responsibility for the care and custody of the land often falls to appointed or elected commissions or committees, a diverse group of people with different backgrounds, interests, and areas of expertise. Any management conducted can have a direct impact on the existing recreational opportunities and the aesthetics of a property. This can result in the preference for a "hands off" philosophy when managing municipal lands. While this approach is appropriate in some places and for some reasons, there are many reasons that an active management philosophy is justified for the long term management of forests in this region.

Actively managing public open spaces for long term benefits including wildlife habitat, water quality protection, enhancing recreational opportunities and maintaining good aesthetics is the basis for conducting good forestry. While it is not always possible to meet every goal on every acre of land, it is usually possible to achieve a variety of goals on a single parcel. Planning out the details of activities ahead of time is critical to success. It is imperative to get all interested parties involved at the beginning of a project. This allows for everyone to have the same expectations of the results of a project, and to work toward meeting those expectations throughout the process. If good quality, well planned forest management activities are conducted more often, it could result in a reduction of the negative association with timber harvesting. This would make it easier to accomplish all of the goals associated with active forest management.

Wildlife habitat enhancement is often cited as a goal on public conservation lands. It would seem that allowing nature to take its course would be the best method for maintaining good wildlife habitat in the long run. While at the surface this sounds good, there are many reasons that it may not be the best approach for local wildlife habitat and populations.

Human activity creates a much different landscape than would otherwise occur without our developed lands. The areas we maintain without vegetation fragment the remaining natural places, and add a lot of edges, where pavement or manicured lawns meet forest habitat. This can result in great success for some species (white-tailed deer, raccoon, grey squirrel, cowbird), but can be a huge detriment to others (ruffed grouse, wood thrush, Cooper's hawk, flying squirrel).

Often, the species that thrive in our suburban habitats also create more impacts on the remaining natural areas. White-tailed deer populations can become too high in areas with a lot of forest edge. In these areas, the deer can prevent new tree and shrub growth in the forest when they browse and feed on this vegetation. This causes an immediate decrease to the quality of wildlife habitat, as many birds and small mammals need the low vegetation for cover and food sources. In the long term, it can be difficult to regenerate new trees in the forest to replace those that grow old or those that are uprooted in a natural disturbance event.

In addition to decreasing the total amount of habitat, humans also prevent a lot of natural disturbances that create more diverse habitat conditions across the landscape. Installing culverts, dismantling beaver dams, and generally preventing flooding helps our way of life, but also prevents forests from flooding and becoming marshes, shrub swamps, and eventually young forests again. Humans put a lot of effort into controlling wildfires. Without human interference, a wildfire caused by a lightning strike could create many acres of young forest after the larger trees die off. Larger disturbances are impacted by humans as well, even if they cannot be totally avoided. Clean-up efforts after tornados and hurricanes alter what would have occurred naturally, removing a lot of coarse woody material that is beneficial to insects, which then are fed on by birds and other wildlife species. While these activities seem normal and even required for our needs of the landscape, they have significant consequences for the natural world around us. The result can be a landscape dominated by areas where humans have taken over, and the remaining forest, consisting of a very uniform, maturing forest without a lot of benefit for many species of wildlife.

Enhancing recreational opportunities is another primary goal on many public forests. Recreation in the forest allows people to become connected with the natural environment around them, as well as to get away from the stress and challenges of our fast-paced society. Maintaining recreational opportunities can be costly, depending on the intensity of use and the current conditions of the land. Forest management activities that are conducted without consideration for recreational use can be a severe detriment to those uses. Planning out management activities can allow for multiple uses on the same property, including recreation, wildlife habitat and timber harvesting. In some cases, existing trails occur on woods roads that were originally created in timber harvesting operations. These roads can often be used in future projects with minimal or temporary impacts to recreational activities. Other situations sometimes require the avoidance of existing trails, but allow for active management for timber or wildlife in the vicinity of trails. If a project is planned properly, it can be completed in a way that enhances existing roads and trails on a property. This can reduce the cost over time of maintaining recreational trails in open space.

Active forest management can be conducted for the benefit of wildlife habitat, forest health, and enhancement of recreational opportunities. While it can be challenging to plan out and implement these projects, a successful result that improves the forest for the long term is well worth the effort.

Property Overview, Regional Significance, and Management Summary

Landscape Overview

The Wekepeke Conservation Easement properties are located in Sterling and Leominster Massachusetts on Upper North Row Road and Heywood Road (Sterling). These properties contain 564 acres of land in two non-contiguous parcels. This land has been under the ownership of the town of Clinton for one and a half centuries, and was managed as a public water supply until 1964, when it was removed from service. These parcels are located in the northwest region of the Wekepeke Brook watershed, a sub-basin of the Nashua River. This sub-basin contains 11.5 square miles of land, and contains a high-yield aquifer that is used for multiple community ground water sources.

There is a significant component of protected open space adjacent to and in close proximity to these parcels. Properties that abut these parcels with permanent protection include Hycrest Farm, consisting of 400 acres under and APR; Fall Brook Reservoir, 440 acres of land under the Leominster Water Supply; Sholan Farm APR, containing 167 acres; the Allen APR lands, with 267 acres; and the Sterling Town Forest, containing 45 acres. Additional protected lands that are nearby include 52 acres under the Leominster Conservation Commission; Grandview Country Club, with a CR held by Mass Audubon, containing 341 acres; Wachusett Reservoir watershed lands, with over 500 acres; and Leominster State Forest, with over 2000 acres in this vicinity. Future development pressure will likely cause the loss of some forest in this area, but this core of permanent open space is an invaluable ecological asset.

Recent History of this Property

In 2007, the town of Clinton tested the water on these sites to determine its capability as a source for drinking water. Later, the town requested proposals from companies who were interested in purchasing the water. In 2008, the town received and rejected a proposal from Nestle Waters North America for the removal of water from these sites for the purposes of bottling. It was also in 2008 that the Wildlife Conservation Easement was placed on these parcels, held by the Massachusetts Division of Fisheries and Wildlife. Nestle continued to fund research on this site to determine the ecological status of the watershed and any implications that may occur from water removals. A study was completed by Rushing Rivers Institute (RRI) for Nestle. In 2011, the Wekepeke Watershed Restoration Initiative was created, consisting of many town boards, state agencies and other private groups. The goal of this organization was to use the RRI report to help restore and preserve the ecological integrity of the brook and surrounding watershed. Unfortunately, this group no longer exists, as the funding provided by Nestle was discontinued.

Current Forest Condition

These parcels consist of maturing upland forest, man-made reservoirs, small beaver ponds and some forested wetlands. The primary forest types include white pine, mixed oak and white pine/oak. Generally, the forest contains maturing timber that has not been managed for some time. Most areas contain an open understory lacking tree regeneration due to the dense tree canopy and the lack of recent active forest management. Through the course of this management planning period, new tree regeneration will be established through harvesting activities that will enhance wildlife habitat and provide the opportunity to extract timber products from time to time.

Forest Health Concerns

There are three forest health concerns that will be addressed in this forest management plan. The first issue could be due to a fire that may have occurred in the southeastern parcel, within the planted white pine stands. Many of the pines in these stand s have seams or cracks on the stem, 2 to 6 feet from the ground. No other evidence of fire was observed, but this condition is not common for white pine stands, unless a fire occurred. The trees with the seams will have a reduced value for timber, and may be more susceptible to windthrow over time. The second heath issue is due to the 2008 ice storm in this region. The oak stands on this property were moderately impacted by this storm, causing broken branches loss of a few major limbs. Few trees died on these parcels from this storm, but there is a long term impact. Trees that lost a lot of branches put out new shoots from the dormant buds in the main stem of the tree. This allows the tree to recover from this impact, but also reduces the timber value of the tree in the long run. When harvesting occurs in these oak stands, the total value realized from the harvest will be impacted due to this storm. The final forest health issue is the presence of non-native invasive plant species. While much of this property is free from these undesired plants, there are a few locations where plants such as Oriental bittersweet, bush honeysuckle, burning bush, multiflora rose and Japanese barberry occur near the edges of reservoirs and in areas that were close to historic houses. These plants can reduce native plant populations in the forest understory, impacting the wildlife habitat and the long term productivity of the forest. Management of these plants is especially important when conducting harvesting, as this disturbance can allow the invasive plants to spread quite rapidly.

Wildlife Habitat

Habitat conditions are good on these parcels at this time. Almost all of this property is included in the BioMap 2, critical natural landscape. In addition, approximately 60 acres along the west side of Heywood Reservoir, is mapped as Priority Habitat by the Natural Heritage and endangered species program. This indicates that there is a known occurrence of a rare or threatened species here. Some of the more prevalent characteristics on this property that are beneficial to wildlife are as follows. Oak trees are excellent for wildlife, providing food resources in the form of hard mast (acorns) as well as being a preferred tree for many species of caterpillars and other insects. These insects become food resources for countless species of birds and other wildlife. There are some soft mast producing species on these parcels as well, including black cherry, maple-leaved viburnum, low-bush blueberry and wintergreen. Berries from these plants are more prevalent where these plants are growing in adequate sunlight. Coarse woody material occurs at moderate levels in much of this property. Down logs support salamanders and can provide drumming logs for grouse. Insects that feed on the decaying wood also become food resources for other wildlife species. One condition that is lacking in much of this forest is a component of tree regeneration in the understory that would provide vertical structure. Promoting additional species composition would provide a more diverse wildlife habitat.

Recreation

There are multiple recreational opportunities on these parcels at this time. In the northwestern parcel, a hiking trail is established to Devil's Pulpit, an interesting rock formation. This trail is a part of the Monoosnoc Trail network and can be accessed from Sholan Farms. In the southeastern property, there are several roads along the reservoirs, and some interior trails mapped as formal trails by the town of Sterling. All of the reservoirs are open to fishing, and used extensively for this purpose.

Cultural Resources

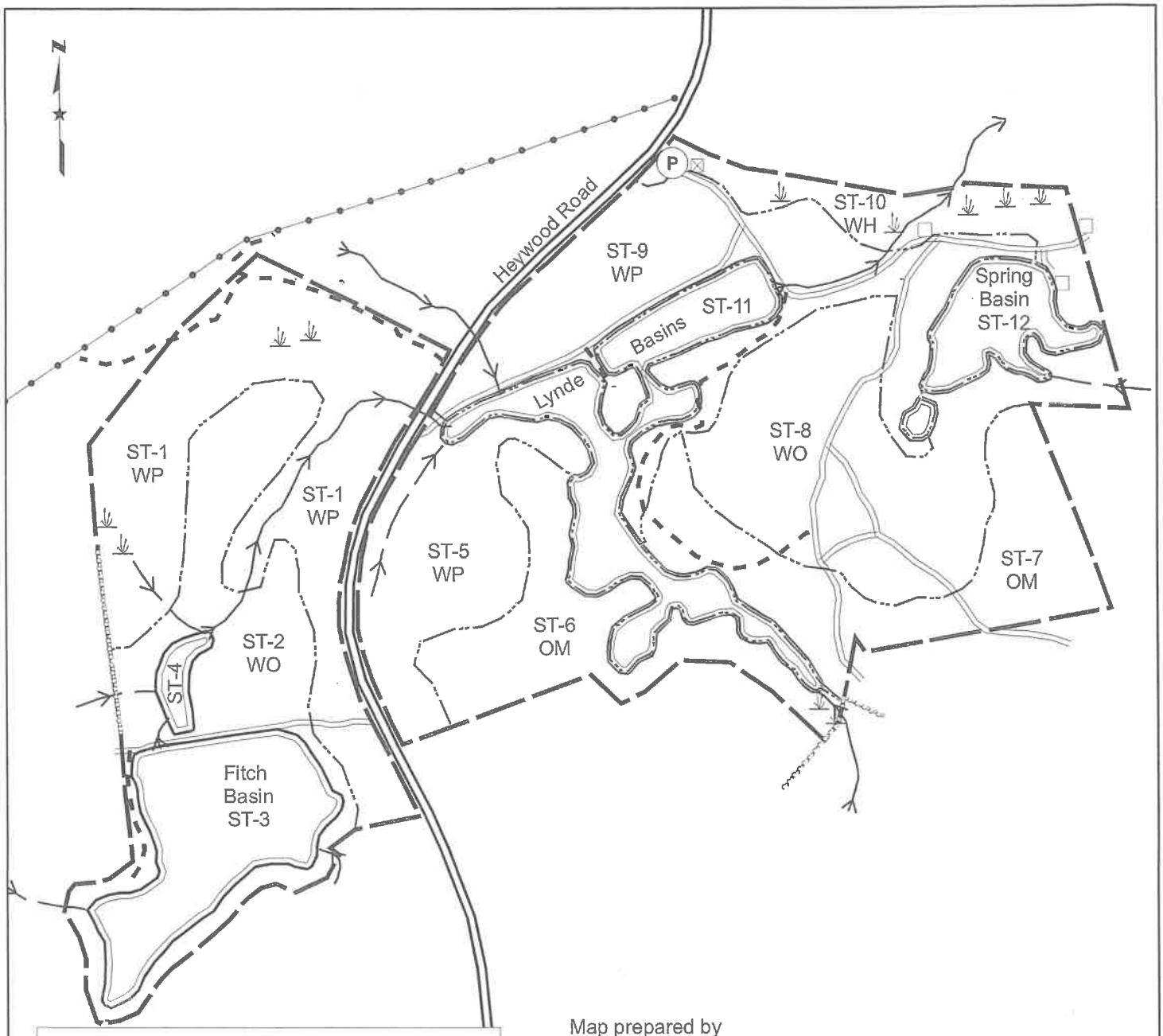
There is an abundance of evidence of the past activity on this land, mainly due to the establishment of the reservoirs and the drinking water supply. Many of the minor stream channels near the reservoirs were re-constructed and lined with stone. Some locations near the reservoirs were excavated for gravel for use in the construction of the dams. These areas are re-naturalizing, but can still be identified as historic gravel pits. A few stone walls occur, showing the past agricultural activity that occurred in this region. The planted white pine stands show the intensive management that happened here when establishing the reservoirs. A cellar hole exists near the trailhead on Heywood road. The house that stood in this location was occupied by the caretaker of the reservoirs when the water supply was active. A few stone walls occur along the property boundaries, showing the past agricultural activity that occurred in this region. This may have been mostly on the land abutting these parcels.

Management Recommendations

Several management activities have been recommended for these parcels in the next ten year timeframe. The first involves conducting timber harvesting activities with the goal of establishing a healthy component of tree regeneration, enhancing the forest health, creating more vertical structure and species diversity for wildlife, and generating revenue for the landowner. The second management recommendation is to implement an invasive plant control program to remove non-native plants and to restore these sites to native plant communities. The final recommendation is to re-establish the property boundaries so that implementation of other recommendations can be completed. Addressing these management recommendations will be a benefit to this land in both the short and long term. Being a good steward of open space allows the public to see what can be accomplished with active forest management, and the benefits that can be demonstrated as a result.

Property Boundary and Forest Stand Map

Property of Clinton Water Works - Wekepeke Southeast
Located on Heywood Road, Sterling, Massachusetts



Legend

- Property Boundary
- Stand Boundary
- Woods Road
- Trail
- Stone Wall
- Pump House/ Cellar Hole
- Pond
- Perennial Stream
- Intermittent Stream/Seep
- Wetland

Map prepared by

BAY STATE FORESTRY SERVICE

Michael Barry
468 South Mountain Road
Northfield, MA 01360

05-2016
From Assessor's Maps,
GPS Data and Field Observations

0 250 500 1,000 Feet

1 inch = 600 feet

Property Location Map

Property of Clinton Water Works - Wekepeke Wildlife Conservation Easement
Located on Heywood and Upper North Row Roads, Sterling and Leominster, Massachusetts

STAND DESCRIPTIONS

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	01	WP	28	15.0	180	17.7 MBF 9.9 Cords	67-WP

Stand 1 is a white pine forest located in the northern portion of the property on the west side of Heywood Road. This area contains mostly white pine in the overstory, with a minor component of hardwoods including red oak, black oak, chestnut oak, red maple, black birch and white ash. Some of this stand appears to have been planted, likely to stabilize the ground and protect the reservoir from siltation when the water supply was active. The trees are of good quality, although the stocking level is high for this forest type and size class. Tree regeneration is sparse, due to the dense overstory canopy. Where trees do occur in the understory, they consist of black birch, white pine, hemlock and red maple. Common shrubs in this stand include mountain laurel, sassafras, chestnut sprouts, high-bush blueberry, maple-leaved viburnum and spicebush. Low to moderate ground cover exists, consisting of low-bush blueberry, wintergreen, partridgeberry, Canada mayflower, club moss and ferns.

This area consists of flat terrain and gentle slopes with southern and eastern aspects. The soils are generally very well drained, although there is an area with damp soils located in a low spot in the northern region of the stand. The soils here have been classified as Merrimack and Hinkley sandy loams and Merrimack and Agawam fine sandy loams. Generally the site conditions here are favorable for growth of white pine and oak. Other species can become established, but the soils are too dry for optimum growth.

One forest health concern exists within this stand. Many of the pines have a crack or a seam within 6 feet of the ground. While there is no other evidence of recent forest fire, this may be an indication that a fire occurred here at some time. Regardless of the cause of these seams, this will reduce the total volume of timber in these trees and will reduce the value of standing timber when it is sold. There were no invasive plants observed in this stand at this time.

The desired future condition of this stand is a healthy mixed species forest with trees originating from natural seeding, rather than a monoculture of planted white pine. This condition will be more beneficial for wildlife habitat, as well as more reslient from a forest health perspective. Establishing a healthy young forest beneath the shade of the overstory provides more options for management in the case of a natural disturbance or disease outbreak. In addition, more complex vertical structure greatly enhances the wildlife habitat in an area with nesting opportunities and cover, as well as more diverse food resources. Even-aged management principals will be used to promote a gradual transition of this stand into a forest that is dominated by hardwoods, especially oak species. It can be expected that a pine component will remain here for some time due to the seed source that is present, but over time, management activities can guide the forest composition toward a hardwood forest.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	02	WO	20.6	13.9	175	14.3 MBF 10.4 Cords	60-WP

Stand 2 is a white pine/oak forest located in the southern portion of the property on the west side of Heywood Road. Most of the acreage in this stand occurs to the north of the Fitch Basin, but the area surrounding the reservoir is also included. White pine and red oak dominate this stand, consisting of about 90% of the total timber volume. Species that occur as a minor composition in this stand include black oak, chestnut oak, black cherry, red maple and yellow birch. Timber quality is good in this stand at this time. The current overstory density is high for a forest of this age class and species composition. This condition limits the growth rates of individual trees. Tree regeneration exists at low densities, consisting of red maple, black birch, red oak, white pine, hickory. A moderate component of shrubs occurs, including mountain laurel; witchazel, maple-leaved viburnum and spicebush. Canada mayflower, wintergreen, dewberry, club moss, low-bush blueberry exist with a patchy distribution.

This stand contains varying site conditions depending on the location in the stand. Most of the stand contains moderately well drained soils on flat and gently sloping terrain with an eastern aspect. In the areas directly adjacent to the reservoir and the beaver pond to the north, the soils hold more moisture, and tree growth is somewhat limited by these conditions. The soils in this area have been classified as Merrimack and Hinkley sandy loams and Merrimack, Agawam and Paxton fine sandy loams. Generally, red oak and white pine will be the most productive tree species in these site conditions.

There is one forest health concern in this stand. Invasive plant species, including bush honeysuckle and burning bush, exist along the dam on the north end of the reservoir and are spreading into the forest to the north. These plants can prevent native tree and shrub growth, reducing the overall diversity of the forest and decreasing the wildlife habitat value. Management of invasive plants can be an cost and labor-intensive project. Dealing with these problems early can reduce the overall costs greatly.

The desired future condition for this stand is a healthy, productive forest consisting of two age classes. White pine and red oak are expected to remain strong components of this stand, but other species will be promoted when healthy specimens become established. Maintaining a component of species such as black cherry, yellow birch and chestnut oak can greatly enhance the wildlife habitat, while having minimal impact on the forest productivity. An even-aged management philosophy will be utilized in management decisions to meet the goals for this area.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	03	WA	12.4				

Stand 3 is Fitch Basin, a man-made reservoir historically used for drinking water for the town of Clinton. This pond now provides benefits for both wildlife habitat and for recreational uses such as fishing and hiking. This area will be maintained in its current condition throughout the course of this management planning period.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	04	BP	1				

Stand 4 is a beaver pond located on the north side of the dam of Fitch Basin, at the outflow of the reservoir. While this area is currently open water, it may transition into wetland vegetation in time if the beaver activity ceases.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	05	WP	14.5	13.6	210	20.6 MBF 16.1 Cords	65-WP

Stand 5 is a white pine forest located in the western region of the property, on the east side of Heywood Road. This area consists of planted white pines, with a small component of hardwoods, including red oak, black cherry and chestnut oak. Stocking levels are very high for a white pine stand of this size class. This is a typical condition for a plantation that has not had any recent forest management implemented. Individual tree growth is being moderately limited by the density of the stand. Tree regeneration occurs in some patches within this stand, even under the dense canopy. Yellow birch, white pine, red maple, black birch, black cherry and chestnut oak are present in the understory. Ground cover is sparse, but some species such as Canada mayflower, partridgeberry and starflower do occur.

This area contains mostly gentle slopes with a northern aspect. The soils are very well drained and moderately productive for growth of white pine and oak. Soils in this stand are classified as Agawam fine sandy loam and Hinkley loam. An intermittent drainage occurs within the stand that has been lined with stone for the purposes of the reservoirs when they were in operation.

The pines in this stand are similar to stand 1, in that they show some evidence of a past disturbance such as a fire. The evidence is in the form of seams on the main stem between 2 and 6 feet off of the ground. No other forest health issues were observed here.

This stand will be managed to develop additional age classes of forest over time, to maintain good productivity of the stand and to protect the long term forest health. Over time, it can be expected that this stand will transition from a white pine forest to a mixed species stand, containing white pine, red oak and good quality specimens of other hardwood species. Increasing the species diversity and the vertical structure in this stand will be a benefit for wildlife and overall forest health.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	06	OR	14	14.4	133	11.8 MBF 5.0 Cords	60-RO

Stand 6 is a red oak forest, located in the southwestern corner of the parcel on the east side of Heywood Road. This stand is dominated by red oak, and also includes a minor composition of chestnut oak, black oak and white pine. Generally, the timber is of good quality in this stand, and the stocking level is good for a forest of this species composition and size class. Tree regeneration occurs at low densities, consisting of red maple, black birch, white pine and chestnut sprouts. There is a moderate shrub component in the stand. Dense patches of mountain laurel occur throughout the stand. Between these patches, other shrubs such as striped maple, maple-leaved viburnum and low-bush blueberry occur. Typical ground cover species are also on this site, including Canada mayflower and lycopods.

This area contains very well drained soil conditions classified as Hinkley sandy loam. Nutrients are somewhat limited by the lack of soil moisture here. This results in better success of plants such as oak trees and mountain laurel, compared to other local plant species. Most of the stand contains gently sloping terrain, but there is some moderate slopes in the eastern region, along the west bank of Lynde Brook.

This stand contains some evidence of ice damage on the oak trees. Broken branches can be observed, and epicormic sprouts are established on some trees. Epicormic branches can greatly reduce the timber value if they occur on the lower stem of the tree. No other forest health issues were observed.

This stand will be managed to maintain the current forest type, and to develop a better component of tree regeneration. Good quality tree regeneration will consist of oaks, white pine, and other species with good form and vigor. Even-aged management practices will be used to promote this condition with a series of management practices conducted over the course of the next few decades. The goal is to have a maturing forest with healthy trees, growing with spacing that will allow for a healthy component of tree regeneration in the understory.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	07	OM	17.5	13.4	118	7.2 MBF 11.4 Cords	58-RO

Stand 7 is a mixed oak forest located in the southeastern region of the property. Oak species (red, chestnut, black) make up most of the stocking in this stand (90%). Minor associates include white pine, red maple, black cherry and hemlock. Generally, the timber quality in this stand is good. The red oak tends to have better form and value for timber products, but the other oaks provide some diversity and substantial wildlife value. Tree regeneration occurs in this stand at low densities. Species observed include red maple, black birch, white pine and hemlock. Very few oaks occur in the understory at this time. In many parts of this stand, there is a dense component of mountain laurel. This shrub can hinder good quality tree regeneration with the dense shade of its foliage. Other shrubs in this stand include witchazel and chestnut sprouts. Some ground cover occurs, where the laurel patches are not as dense. Common species include low-bush blueberry, wintergreen and club mosses.

This area contains gentle to moderate slopes on rolling terrain with variable directions of aspect. The soils are very well drained and classified as Hinkley sandy loam and Windsor loamy sand. Conditions here are best suited for oak growth, as other species will require additional soil moisture for optimum growth.

Oaks in this stand show moderate evidence of recent ice damage with broken branches and some epicormic branching. This may reduce the timber value with lower log grades, but the trees are expected to continue good growth and recover from this disturbance over time. No invasive plant species were observed in this stand.

The desired future condition of this stand is a healthy oak-dominated forest, containing good quality timber and a better composition of tree regeneration. It may be a challenge to establish desired tree regeneration with the dense laurel component, but this will be the long term goal for this stand. Maintaining different species of oaks as well as a minor component of other tree species is desired to maintain good forest diversity and wildlife habitat conditions.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	08	WO	27	14.0	128	11.1 MBF 8.9 Cords	65-WP

Stand 8 is a white pine/oak forest located in the eastern part of the property, between the Lynde Basins and Spring Basin. This stand contains white pine, red oak, chestnut oak and black oak sawtimber, along with a minor component of trees such as red maple, black birch and poplar. Timber quality is good, and the stocking level in this stand is appropriate for a stand of this age class and species composition. Tree regeneration is sparse, and consists of white pine, black birch, hemlock and chestnut sprouts where it does occur. There are some areas where mountain laurel dominates the understory. In other locations, striped maple and low-bush blueberry can be observed. Ground cover plants consist of wintergreen, Indian pipe and club moss.

This area contains rolling terrain similar to that of stand 7. In the central portion of the stand, some flat terrain does occur. Soils are classified as hinckley sandy loam and Windsor loamy sand. These soils are very well drained, and best suited for oaks and white pine. A small area with damp soil conditions (Freetown muck) occurs along a drainage that leads into Spring Basin.

The oaks in this stand have been impacted by ice storm damage. Most trees are expected to recover adequately to maintain good forest health. The timber value may be impacted when harvesting is conducted due to epicormic branching in these trees. No invasive plant species or other forest health issues were observed in this area.

The desired future condition of this stand is a healthy mixed-species stand, with a more dense component of tree regeneration. Areas of mountain laurel may need to be addressed when conducting harvesting in order to promote the success of desired tree regeneration. Maintaining a softwood component in this stand will help promote more wildlife diversity for birds such as Canada warbler and white-throated sparrow. Generally, the better quality stems will be retained longer, and poorly formed trees and those with less vigor will be harvested sooner. This will help to promote better long term productivity and returns from harvesting activities.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	09	WP	26.5	16.3	188	17.1 MBF 12.7 Cords	62-WP

Stand 9 is a white pine forest located in the northern part of the property and in the areas surrounding the reservoirs. Most of this stand consists of planted white pine that was established to protect the water quality in the reservoirs. Some parts of this stand contain a component of red oak, and a minor composition of other species including black cherry, black oak, chestnut oak, poplar and hemlock. Due to the dense overstory canopy, tree regeneration is sparse in most parts of this stand. Where regeneration occurs, it consists of red maple, black birch, white ash, white pine, black cherry and striped maple. Shrub species observed in the understory include witchazel, mountain laurel, grape vines, blackberry, poison ivy, alternate-leaf dogwood, hobblebush and spicebush. Ground cover vegetation includes Canada mayflower, low-bush blueberry, starflower, trillium and fern species.

This stand contains varying conditions, including dry ground with moderate slopes near the reservoirs, flat upland terrain, and flat terrain near drainages containing somewhat poorly drained soils. Most of this stand occurs on Hinkley sandy loam, and a small area classified as Walpole fine sandy loam occurs along Wekepeke Brook at the outflow of Lower Lynde Basin. The conditions in this stand are moderately productive for white pine. A mix of hardwood species will also do well in these conditions.

Some of the pine in this stand contain seams on the lower part of the stem, as in stands 1 and 5. This could have been from a fire in this area, or could be associated with the trees from a planted origin. Invasive plants exist in parts of this stand, at low densities. The invasive plants in this stand are most prevalent along the north edge of the reservoir and along the main access road. Species observed include multiflora rose, Oriental bittersweet, burning bush, honeysuckle, and barberry. These plants can spread quite rapidly, especially after forest management activities are conducted, reducing the forest health and productivity.

The desired future condition of this stand is a healthy forest with a more diverse species composition. It can be expected that pine and oak will be more dominant species here, but a component of other tree species is desired, including black cherry, poplar and black and yellow birch. Management activities conducted in this stand will focus on multiple goals, including soil protection near the reservoirs, maintaining good aesthetics for recreational users, promoting good forest health for both the overstory and tree regeneration, and establishing an understory with native plants, rather than non-native invasives.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	10	OH	8.5	14.7	120	8.0 MBF 10.8 Cords	55-RO

Stand 10 is an oak/hardwood forest located along the northern property boundary. Some of this area has been flooded by beaver activity, and contains standing dead trees. Other parts of the stand are dry enough to support tree growth. Species present include red oak, poplar, black oak, white pine red maple and black cherry. Tree regeneration occurs at low stocking levels, consisting of white pine, black cherry, red maple, hemlock and white ash. A dense shrub component occurs in parts of this stand, consisting of alder, spicebush, witchazel, maple-leaved viburnum, choke cherry, striped maple and poison ivy. Ground cover species include trillium, small Solomon's seal, Canada mayflower and grass species.

This stand occurs on flat terrain surrounding Wekepeke Brook as it flows out of Lower Lynde Basin. The beaver activity here causes this area to be very dynamic in the vegetation that is present, as trees get flooded out, and wetland vegetation takes over. Soils are classified as hinkley sandy loam and Walpole fine sandy loam. Generally, much of this area contains soils that are saturated for a good portion of the growing season.

One forest health issue in this area is the presence of beaver. The beavers girdle and fell trees to create dams and to provide themselves with food resources. While this is an impact to the trees in this area, it is a natural condition and provides for more diverse and changing wildlife habitat conditions on the property. There is a component of invasive plants in this stand. The density of the invasive plants ranges from high near the parking area and cellar hole, to low in the eastern part of the stand. Invasive plants here include Oriental bittersweet, multiflora rose, honeysuckle and barberry.

The desired future condition of this stand is a healthy forest and wetland complex, dominated by native vegetation. While conventional forest management activities are not recommended in these sensitive soil conditions, this area does provide quite a benefit in the form of a diverse wildlife habitat. Maintaining this area free of invasive plants will help to maximize this benefit in the long term.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	11	WA	13.5				

Stand 11 consists of two man-made reservoirs separated by a concrete spillway, called the Lynde Basins. These ponds were formally a part of the town of Clinton's water supply. Currently, there are trails near the ponds used by hikers, and fishing is an allowed activity.

OBJ	STD NO	TYPE	AC	MSD OR SIZE-CLASS	BA/AC	VOL/AC	SITE INDEX
STEW	12	WA	5.5				

Stand 12 is a man-made reservoir named the Spring Basin. This stand also includes a small beaver pond area located at the southwestern edge of the basin.

MANAGEMENT PRACTICES
to be done within next 10 years

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	1	WP	Shelterwood - Prep cut	25	55	130 MBF 85.0 CDS	2018-20

Harvesting in stands 1 and 2 will be completed as a single project and will be completed with the objectives described in this narrative.

The goal of this harvest is to increase the growth rate on the better quality trees (crop trees) in the stands and to create gaps in the canopy with the intention of developing a better component of tree regeneration. The goal of this harvest is to develop a two-aged forest in the future, as the regeneration component becomes established. Trees to be removed will include those that have defects in the main stem such as forks or crooks, those that have poor crown position (intermediate or suppressed), and sawtimber trees that are crowding the crop trees. Some better quality trees will be removed to meet the residual basal area goal for this harvest. Preferred crop trees will be primarily red oak and white pine, but will also include other species when trees with good form and vigor are identified. Trees such as black cherry, yellow birch and chestnut oak will be retained and promoted for wildlife value. White pine will be retained in groups to protect against windthrow after the harvest. Access for this harvest will be from the existing woods road in the southeastern portion of this parcel. Appropriate buffers will be retained along stream channels, in the vicinity of Fitch Basin and the beaver pond, and within other areas with wetland soils.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	2	WO	Shelterwood - Prep cut	15	50	50 MBF 75.0 CDS	2018-20

See the above management description for the details of harvesting in this stand.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	5	WP	Shelterwood - Prep cut	14	65	85 MBF 100.0 CDS	2021-23

Harvesting in stands 5,6,7,8,and 9 will be completed as a single project and will be completed with the objectives described in this narrative.

Stands 5 through 9 contain white pine, white pine/oak and mixed oak forest. These forest types are well suited to similar silvicultural prescriptions. While the forest types differ, the structure and age class of these stands is very uniform across these stands. The goal of this harvest is to provide more growing space for the best timber quality trees and to establish a healthy understory with a better component of tree regeneration. Trees to be removed will be those with poor growth form, and those that have small crown size due to their canopy position. Some sawtimber will be removed to create appropriate gaps in the canopy and to meet the residual stocking goal. In general, the goal will be to retain red oak and white pine as a dominant component of the stand. In order to enhance wildlife habitat conditions, the following factors will be considered. Maintain and encourage species such as chestnut oak and poplar where they occur. Remove groups of white pine in order to regenerate hardwood species or mixed species forest. Create small to medium gaps in other parts of these stands to establish a dense regeneration component.

Mountain laurel is significant factor in some of these stands. One option to consider in these areas is to require that some patches of laurel be cut or crushed as a part of the timber harvest contract. This will help to promote the desired tree regeneration after the harvest. Not all laurel will be addressed in this practice. Small patches of cut or crushed laurel can help to promote tree regeneration. The laurel will return to these areas from the existing root systems, so this is considered a temporary condition, hopefully long enough to establish good quality tree regeneration. Access to stands 7,8 and 9 will be from the existing access road in the northern portion of the parcel. Stands 5 and 6 will be accessed from a second landing and access point to be established in this project. Buffers will be maintained along the reservoirs and along stream channels within the harvest area. In these areas, at least 50% of the trees will be retained.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	6	OR	Shelterwood - Prep cut	14	40	50 MBF 40.0 CDS	2021-23

See the above management description for the details of harvesting in this stand.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	7	OM	Shelterwood - Prep cut	17	30	45 MBF 80.0 CDS	2021-23

See the above management description for the details of harvesting in this stand.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	8	WO	Shelterwood - Prep cut	24	35	75 MBF 110.0 CDS	2021-23

See the above management description for the details of harvesting in this stand.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	9	WP	Shelterwood - Prep cut	20	55	100 MBF 140.0 CDS	2021-23

See the above management description for the details of harvesting in this stand.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	2	WO	Invasive Plant Control	7			2017-20

Invasive plants including honeysuckle and burning bush occur in the area to the north of Fitch Basin at medium densities at this time. Without management, these plants will likely spread into more area of this forest, especially after harvesting is conducted. It is recommended that a multiple year control program be implemented to restore this area to native plant populations. The control program will consist of a combination of mechanical cutting and foliar herbicide applications. Near the reservoir, larger shrubs will be cut, and the cut surface will be treated with herbicide. This will prevent re-sprouting of the plant. Smaller plants, and those in the forested area will be treated with a selective foliar herbicide application, conducted with trained and licensed applicators. This treatment method will help to prevent damage to native plants while controlling the undesired invasive plants. At least two follow-up treatments are recommended in consecutive growing seasons. After the three treatments, a monitoring program should be implemented to ensure that good control has been achieved and that no new infestations become established. New individual plants can be hand-pulled to prevent future invasive plant problems.

OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	9,10		Invasive plant control	12			2017-20

Invasive plants including multiflora rose, Oriental bittersweet, burning bush, honeysuckle and barberry occur in stands 9 and 10. These plants generally occur near the trailhead on Heywood Road, along the north edge of the Lynde Basins, and in the wet soils of stand 10 to the north of the access road. The invasive plants occur at low to moderate densities at this time. A control program in this area will include cutting of larger plants near the reservoirs and bittersweet vines that are observed. The cut stumps will be treated with herbicide to prevent re-sprouting. This method will allow for the protection of the local water resources. Other plants will be treated with a selective foliar herbicide application. Follow-up foliar treatments are recommended to control any new plants establishing from the seed bank, and to treat any plants missed in the first treatment. Once good control is obtained, a monitoring program should be implemented to prevent future invasive plant outbreaks.

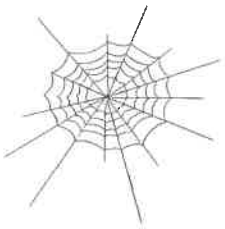
OBJ	STD NO	TYPE	SILVICULTURAL PRESCRIPTION	AC	TO BE REMOVED		TIMING
					BA/AC	TOT VOL	
STEW	ALL		Boundary Maintenance				2017, 2026

The forest stewardship program recommends that all property boundaries be kept visibly painted. Maintaining well marked boundary lines helps to prevent trespass issues and allows for more efficient implementation of forest management activities. The boundaries on this property were marked in some areas, but it has been quite some time since the boundaries have been marked. On much of this property, the corners were marked with 2 inch iron pipes. Some areas have aluminum tags on the corners with notations of located boundary evidence (from Rex Baker). Other areas have blazed trees and old blue boundary paint. It is recommended that the boundary lines on all of this property be re-established by painting trees along the lines, early in this management planning period. The status of the boundaries will be re-examined at the end of this management planning period to determine additional maintenance necessary.

Note: The following 7 pages are educational materials supplied by the MA Forest Stewardship Program

Stewardship Issues

Massachusetts is a small state, but it contains a tremendous variety of ecosystems, plant and animal species, management challenges, and opportunities. This section of your plan will provide background information about the Massachusetts forest landscape as well as issues that might affect your land. **The Stand Descriptions and Management Practices sections of your plan will give more detailed property specific information** on these subjects tailored to your management goals.



Biodiversity: Biological diversity is, in part, a measure of the variety of plants and animals, the communities they form, and the ecological processes (such as water and nutrient cycling) that sustain them. With the recognition that each species has value, individually and as part of its natural community, maintaining biodiversity has become an important resource management goal.

While the biggest threat to biodiversity in Massachusetts is the loss of habitat to development, another threat is the introduction and spread of invasive non-native plants. Non-native invasives like European Buckthorn, Asiatic Bittersweet, and Japanese Honeysuckle spread quickly, crowding out or smothering native species and upsetting and dramatically altering ecosystem structure and function. Once established, invasives are difficult to control and even harder to eradicate. Therefore, vigilance and early intervention are paramount.

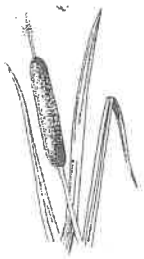
Another factor influencing biodiversity in Massachusetts concerns the amount and distribution of forest growth stages. Wildlife biologists have recommended that, for optimal wildlife habitat on a landscape scale, 5-15% of the forest should be in the seedling stage (less than 1" in diameter). Yet we currently have no more than 2-3% early successional stage seedling forest across the state. There is also a shortage of forest with large diameter trees (greater than 20"). See more about how you can manage your land with biodiversity in mind in the "Wildlife" section below. (Also refer to *Managing Forests to Enhance Wildlife Diversity in Massachusetts* and *A Guide to Invasive Plants in Massachusetts* in the binder pockets.)

Rare Species: Rare species include those that are **threatened** (abundant in parts of its range but declining in total numbers, those of **special concern** (any species that has suffered a decline that could threaten the species if left unchecked), and **endangered** (at immediate risk of extinction and probably cannot survive without direct human intervention). Some species are threatened or endangered globally, while others are common globally but rare in Massachusetts.

Of the 2,040 plant and animal species (not including insects) in Massachusetts, 424 are considered rare. About 100 of these rare species are known to occur in woodlands. Most of these are found in wooded wetlands, especially vernal pools. These temporary shallow pools dry up by late summer, but provide crucial breeding habitat for rare salamanders and a host of other unusual forest dwelling invertebrates. Although many species in Massachusetts are adapted to and thrive in recently disturbed forests, rare species are often very sensitive to any changes in their habitat

Indispensable to rare species protection is a set of maps maintained by the Division of Fisheries and Wildlife's Natural Heritage & Endangered Species Program (NHESP) that show current and historic locations of rare species and their habitats. The maps of your property will be compared to these rare

species maps and the result indicated on the upper right corner of the front page of the plan. Prior to any regulated timber harvest, if an occurrence does show on the map, the NHESP will recommend protective measures. Possible measures include restricting logging operations to frozen periods of the year, or keeping logging equipment out of sensitive areas. You might also use information from NHESP to consider implementing management activities to improve the habitat for these special species.



Riparian and Wetlands Areas: Riparian and wetland areas are transition areas between open water features (lakes, ponds, streams, and rivers) and the drier terrestrial ecosystems. More specifically, a **wetland** is an area that has hydric (wet) soils and a unique community of plants that are adapted to live in these wet soils. Wetlands may be adjacent to streams or ponds, or a wetland may be found isolated in an otherwise drier landscape. A **riparian area** is the transition zone between an open water feature and the uplands (see Figure 1). A riparian zone may contain wetlands, but also includes areas with somewhat better drained soils. It is easiest to think of riparian areas as the places where land and water meet.

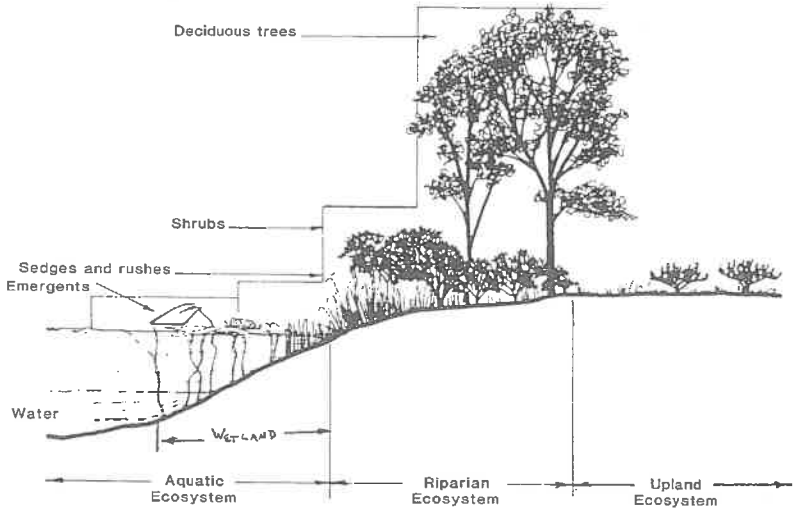


Figure 1: Example of a riparian zone.

The presence of water in riparian and wetland areas make these special places very important. Some of the functions and values that these areas provide are described below:

Filtration: Riparian zones capture and filter out sediment, chemicals and debris before they reach streams, rivers, lakes and drinking water supplies. This helps to keeps our drinking water cleaner, and saves communities money by making the need for costly filtration much less likely.

Flood control: By storing water after rainstorms, these areas reduce downstream flooding. Like a sponge, wetland and riparian areas absorb stormwater, then release it slowly over time instead of in one flush.

Critical wildlife habitat: Many birds and mammals need riparian and wetland areas for all or part of their life cycles. These areas provide food and water, cover, and travel corridors. They are often the most important habitat feature in Massachusetts' forests.

Recreational opportunities: Our lakes, rivers, streams, and ponds are often focal points for recreation. We enjoy them when we boat, fish, swim, or just sit and enjoy the view.

In order to protect wetlands and riparian areas and to prevent soil erosion during timber harvesting activities, Massachusetts promotes the use of "Best Management Practices" or BMPs. Maintaining or reestablishing the protective vegetative layer and protecting critical areas are the two rules that underlie these common sense measures. DCR's Massachusetts Forestry Best Practices Manual (included with this plan) details both the legally required and voluntary specifications for log landings, skid trails, water bars, buffer strips, filter strips, harvest timing, and much more.

The two Massachusetts laws that regulate timber harvesting in and around wetlands and riparian areas are the Massachusetts Wetlands Protection Act (CH 131), and the Forest Cutting Practices Act (CH132). Among other things, CH132 requires the filing of a cutting plan and on-site inspection of a harvest operation by a DCR Service Forester to ensure that required BMPs are being followed when a commercial harvest exceeds 25,000 board feet or 50 cords (or combination thereof).

Soil and Water Quality: Forests provide a very effective natural buffer that holds soil in place and protects the purity of our water. The trees, understory vegetation, and the organic material on the forest floor reduce the impact of falling rain, and help to insure that soil will not be carried into our streams and waterways.

To maintain a supply of clean water, forests must be kept as healthy as possible. Forests with a diverse mixture of vigorous trees of different ages and species can better cope with periodic and unpredictable stress such as insect attacks or windstorms.

Timber harvesting must be conducted with the utmost care to ensure that erosion is minimized and that sediment does not enter streams or wetlands. Sediment causes turbidity which degrades water quality and can harm fish and other aquatic life. As long as Best Management Practices (BMPs) are implemented correctly, it is possible to undertake active forest management without harming water quality.

Forest Health: Like individual organisms, forests vary in their overall health. The health of a forest is affected by many factors including weather, soil, insects, diseases, air quality, and human activity. Forest owners do not usually focus on the health of a single tree, but are concerned about catastrophic events such as insect or disease outbreaks that affect so many individual trees that the whole forest community is impacted.

Like our own health, it is easier to prevent forest health problems then to cure them. This preventative approach usually involves two steps. First, it is desirable to maintain or encourage a wide diversity of tree species and age classes within the forest. This diversity makes a forest less susceptible to a single devastating health threat. Second, by thinning out weaker and less desirable trees, well-spaced healthy

individual trees are assured enough water and light to thrive. These two steps will result in a forest of vigorously growing trees that is more resistant to environmental stress.

Fire: Most forests in Massachusetts are relatively resistant to catastrophic fire. Historically, Native Americans commonly burned certain forests to improve hunting grounds. In modern times, fires most often result from careless human actions. The risk of an unintentional and damaging fire in your woods could increase as a result of logging activity if the slash (tree tops, branches, and debris) is not treated correctly. Adherence to the Massachusetts slash law minimizes this risk. Under the law, slash is to be removed from buffer areas near roads, boundaries, and critical areas and lopped close to the ground to speed decay. Well-maintained woods roads are always desirable to provide access should a fire occur.

Depending on the type of fire and the goals of the landowner, fire can also be considered as a management tool to favor certain species of plants and animals. Today the use of prescribed burning is largely restricted to the coast and islands, where it is used to maintain unique natural communities such as sandplain grasslands and pitch pine/scrub oak barrens. However, state land managers are also attempting to bring fire back to many of the fire-adapted communities found elsewhere around the state.

Wildlife Management: Enhancing the wildlife potential of a forested property is a common and important goal for many woodland owners. Sometimes actions can be taken to benefit a particular species of interest (e.g., put up Wood Duck nest boxes). In most cases, recommended management practices can benefit many species, and fall into one of three broad strategies. These are **managing for diversity, protecting existing habitat, and enhancing existing habitat**.

Managing for Diversity – Many species of wildlife need a variety of plant communities to meet their lifecycle requirements. In general, a property that contains a diversity of habitats will support a more varied wildlife population. A thick area of brush and young trees might provide food and cover for grouse and cedar waxwing; a mature stand of oaks provides acorns for foraging deer and turkey; while an open field provides the right food and cover for cottontail rabbits and red fox. It is often possible to create these different habitats on your property through active management. The appropriate mix of habitat types will primarily depend on the composition of the surrounding landscape and your objectives. It may be a good idea to create a brushy area where early successional habitats are rare, but the same practice may be inappropriate in the area's last block of mature forest.

Protecting Existing Habitat – This strategy is commonly associated with managing for rare species or those species that require unique habitat features. These habitat features include vernal pools, springs and seeps, forested wetlands, rock outcrops, snags, den trees, and large blocks of unbroken forest. Some of these features are rare, and they provide the right mix of food, water, and shelter for a particular species or specialized community of wildlife. It is important to recognize their value and protect their function. This usually means not altering the feature and buffering the resource area from potential impacts.

Enhancing Existing Habitat – This strategy falls somewhere between the previous two. One way the wildlife value of a forest can be enhanced is by modifying its structure (number of canopy layers, average tree size, density). Thinning out undesirable trees from around large crowned mast (nut and fruit) trees will allow these trees to grow faster and produce more food. The faster growth will also accelerate the development of a more mature forest structure, which is important for some species. Creating small gaps or forest openings generates groups of seedlings and saplings that provide an additional layer of cover, food, and perch sites.

Each of these three strategies can be applied on a single property. For example, a landowner might want to increase the habitat diversity by reclaiming an old abandoned field. Elsewhere on the property, a stand of young hardwoods might be thinned to reduce competition, while a "no cut" buffer is set up around a vernal pool or other habitat feature. The overview, stand description and management practice sections of this plan will help you understand your woodland within the context of the surrounding landscape and the potential to diversify, protect or enhance wildlife habitat.

Wood Products: If managed wisely, forests can produce a periodic flow of wood products on a sustained basis. Stewardship encompasses finding ways to meet your current needs while protecting the forest's ecological integrity. In this way, you can harvest timber and generate income without compromising the opportunities of future generations.

Massachusetts forests grow many highly valued species (white pine, red oak, sugar maple, white ash, and black cherry) whose lumber is sold throughout the world. Other lower valued species (hemlock, birch, beech, red maple) are marketed locally or regionally, and become products like pallets, pulpwood, firewood, and lumber. These products and their associated value-added industries contribute between 200 and 300 million dollars annually to the Massachusetts economy.

By growing and selling wood products in a responsible way you are helping to our society's demand for these goods. Harvesting from sustainably managed woodlands – rather than from unmanaged or poorly managed forest – benefits the public in a multitude of ways. The sale of timber, pulpwood, and firewood also provides periodic income that you can reinvest in the property, increasing its value and helping you meet your long-term goals. Producing wood products helps defray the costs of owning woodland, and helps private landowners keep their forestland undeveloped.

Cultural Resources: Cultural resources are the places containing evidence of people who once lived in the area. Whether a Native American village from 1,700 years ago, or the remains of a farmstead from the 1800's, these features all tell important and interesting stories about the landscape, and should be protected from damage or loss.

Massachusetts has a long and diverse history of human habitation and use. Native American tribes first took advantage of the natural bounty of this area over 10,000 years ago. Many of these villages were located along the coasts and rivers of the state. The interior woodlands were also used for hunting, traveling, and temporary camps. Signs of these activities are difficult to find in today's forests. They were obscured by the dramatic landscape impacts brought by European settlers as they swept over the area in the 17th and 18th centuries.

By the middle 1800's, more than 70% of the forests of Massachusetts had been cleared for crops and pastureland. Houses, barns, wells, fences, mills, and roads were all constructed as woodlands were converted for agricultural production. But when the Erie Canal connected the Midwest with the eastern cities, New England farms were abandoned for the more productive land in the Ohio River valley, and the landscape began to revert to forest. Many of the abandoned buildings were disassembled and moved, but the supporting stonework and other changes to the landscape can be easily seen today.

One particularly ubiquitous legacy of this period is stone walls. Most were constructed between 1810 and 1840 as stone fences (wooden fence rails had become scarce) to enclose sheep within pastures, or to exclude them from croplands and hayfields. Clues to their purpose are found in their construction. Walls that surrounded pasture areas were comprised mostly of large stones, while walls abutting former cropland accumulated many small stones as farmers cleared rocks turned up by their plows. Other cultural features to look for include cellar holes, wells, old roads and even old trash dumps.

Recreation and Aesthetic Considerations: Recreational opportunities and aesthetic quality are the most important values for many forest landowners, and represent valid goals in and of themselves. Removing interfering vegetation can open a vista or highlight a beautiful tree, for example. When a landowner's goals include timber, thoughtful forest management can be used to accomplish silvicultural objectives while also reaching recreational and/or aesthetic objectives. For example, logging trails might be designed to provide a network of cross-country ski trails that lead through a variety of habitats and reveal points of interest.

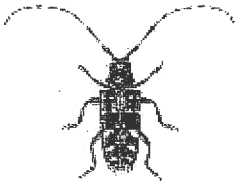
If aesthetics is a concern and you are planning a timber harvest, obtain a copy of this excellent booklet: *A Guide to Logging Aesthetics: Practical Tips for Loggers, Foresters & Landowners*, by Geoffrey T. Jones, 1993. (Available from the Northeast Regional Agricultural Engineering Service, (607) 255-7654, for $7). Work closely with your consultant to make sure the aesthetic standards you want are included in the contract and that the logger selected to do the job executes it properly. The time you take to plan ahead of the job will reward you and your family many times over with a fuller enjoyment of your forest, now and well into the future.

Invasive Species Management: Invasive species pose immediate and long-term threats to the woodlands of MA. Defined as a non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human, animal, or plant health, invasives are well-adapted to a variety of environmental conditions, **out-compete more desirable native species, and often create monocultures devoid of biological diversity. The websites of the Invasive Plant Atlas of New England, www.nbii-nin.ciesin.columbia.edu/ipane, and the New England Wildflower Society, www.newfs.org are excellent sources of information regarding the identification and management of invasive plants. Some of the common invasive plants found in MA are listed below.**

- **Oriental Bittersweet (Celastrus orbiculata)**
- **Glossy Buckthorn (Frangula alnus)**
- **Multiflora Rose (Rosa multiflora)**

- Japanese Barberry (Berbis thunbergii)
- Japanese Knotweed (Fallopia japonica)
- Autumn Olive (Eleaeagnus umbellata)

Early detection and the initiation of control methods soon after detection are critical to suppressing the spread of invasive species. Selective application of the proper herbicide is often the most effective control method. See the next section for information on the use of chemicals in forest management activities.



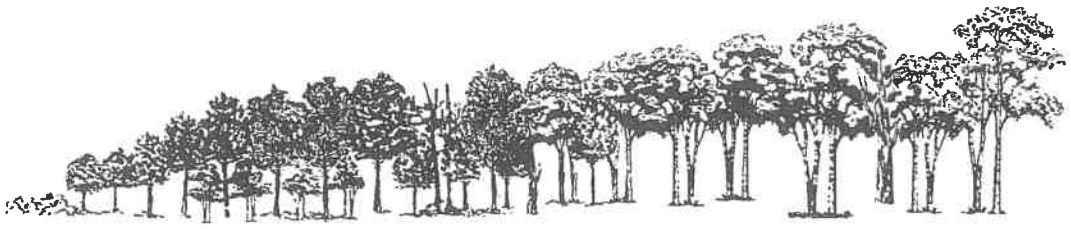
Pesticide Use

Pesticides such as herbicides, insecticides, fungicides, and rodenticides are used to control "pests". A pest is any mammal, bird, invertebrate, plant, fungi, bacteria or virus deemed injurious to humans and/or other mammals, birds, plants, etc. The most common forest management use of a pesticide by woodland owners is the application of herbicide to combat invasive species. MA DCR suggests using a management system(s) that promotes the development and adoption of an environmentally friendly Integrated Pest Management (IPM) method of pest management that strives to minimize the use of chemical pesticides and minimize impact to desirable native species. If chemicals are used, proper equipment and training should be utilized to minimize health and environmental risks. In Massachusetts, the application of pesticides is regulated by the MA Pesticide Control Board. For more information, contact MA Department of Agricultural Resources (MDAR), Pesticide Bureau at (617) 626-1776

On MA Private Lands Group Certification member properties, no chemicals listed in CHEMICAL PESTICIDES IN CERTIFIED FORESTS: INTERPRETATION OF THE FSC PRINCIPLES AND CRITERIA, Forest Stewardship Council, Revised and Approved, July 2002, may be used.

This is your Stewardship Plan. It is based on the goals that you have identified. The final success of your Stewardship Plan will be determined first, by how well you are able to identify and define your goals, and second, by the support you find and the resources you commit to implement each step.

It can be helpful and enjoyable to visit other properties to sample the range of management activities and see the accomplishments of others. This may help you visualize the outcome of alternative management decisions and can either stimulate new ideas or confirm your own personal philosophies. Don't hesitate to express your thoughts, concerns, and ideas. Keep asking questions! Please be involved and enjoy the fact that you are the steward of a very special place.



Signature Page Please check each box that applies.

☐ **CH. 61/61A Management Plan** I attest that I am familiar with and will be bound by all applicable Federal, State, and Local environmental laws and /or rules and regulations of the Department of Conservation and Recreation. I further understand that in the event that I convey all or any portion of this land during the period of classification, I am under obligation to notify the grantee(s) of all obligations of this plan which become his/hers to perform and will notify the Department of Conservation and Recreation of said change of ownership.

☒ **Forest Stewardship Plan.** When undertaking management activities, I pledge to abide by the management provisions of this Stewardship Management Plan during the ten year period following approval. I understand that in the event that I convey all or a portion of the land described in this plan during the period of the plan, I will notify the Department of Conservation and Recreation of this change in ownership.

☐ **Green Certification.** I pledge to abide by the FSC Northeast Regional Standards and MA private lands group certification for a period of five years. To be eligible for Green Certification you must also check the box below.

☐ **Tax considerations.** I attest that I am the registered owner of this property and have paid any and all applicable taxes, including outstanding balances, on this property.

Signed under the pains of perjury.

Owner(s) _____ Date 7-20-16

Owner(s) _____ Date _____

I attest that I have prepared this plan in good faith to reflect the landowner's interest.

Plan Preparer _____ Date 8/1/16

I attest that the plan satisfactorily meets the requirements of CH61/61A and/or the Forest Stewardship Program.

Approved, Service Forester _____ Date 9-21-2016

Approved, Regional Supervisor _____ Date 9/23/16

In the event of a change of ownership of all or part of the property, the new owner must file an amended Ch. 61/61A plan within 90 days from the transfer of title to insure continuation of Ch. 61/61A classification.

Owner(s) Clinton Water Works Town(s) Clinton